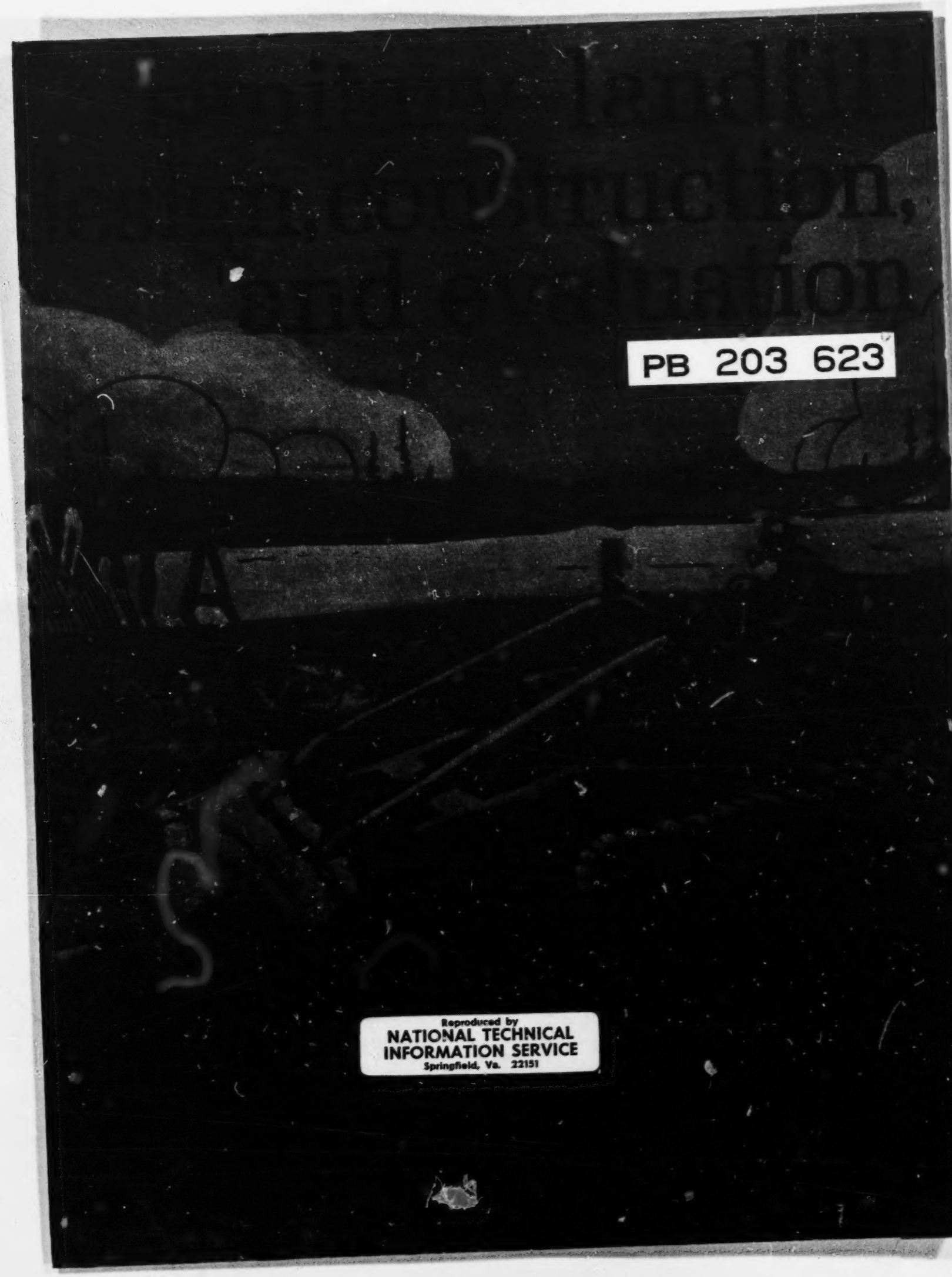


Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
Springfield, Va. 22151

| BIBLIOGRAPHIC DATA SHEET | 1. Report No. EPA-SW-88ts-71 | 2. | 3. Recipient's Accession No. |
|---|---|---|---|
| 4. Title and Subtitle<br>SANITARY LANDFILL DESIGN, CONSTRUCTION, AND EVALUATION | | | 5. Report Date<br>1971<br>6. |
| 7. Author(s)<br>Maxwell J. Wilcomb, and H. Lanier Hickman, Jr. | | | 8. Performing Organization Rept. No. |
| 9. Performing Organization Name and Address<br>U. S. Environmental Protection Agency<br>Office of Solid Waste Management Programs<br>Rockville, Maryland 20852 | | | 10. Project/Task/Work Unit No.<br>11. Contract/Grant No. |
| 12. Sponsoring Organization Name and Address<br>U. S. Environmental Protection Agency<br>Office of Solid Waste Management Programs<br>Rockville, Maryland 20852 | | | 13. Type of Report & Period Covered<br>14. |

15. Supplementary Notes

16. Abstracts

The report provides information to help designers, operators, and control agencies achieve and maintain good sanitary landfill practices. Recommendations suggest basic requirements involved in designing and constructing a sanitary landfill. An evaluation method has been developed to measure the level of acceptability of the operations taking place at a disposal site and to provide a comparison of its suitability with that of other evaluated sites. The evaluation provides a tool that a community, organization, consultant, or citizen can use to judge the design and construction of any site under consideration.

17. Key Words and Document Analysis. 17a. Descriptors

*Refuse disposal, *Design criteria, *Site selection, Evaluation, Requirements, Recomendations

17b. Identifiers/Open-Ended Terms

*Solid waste disposal, *Sanitary landfill

17c. COSATI Field/Group 13B

| 18. Availability Statement | 19. Security Class (This Report) | 21. No. of Pages |
|---|---|---|
| Microfiche copy - NTIS<br>Paper copy - available from Superintendent of Documents, Washington D C 20402.SN 5502-0031 | UNCLASSIFIED | ~~77~~ 15 |
| | 20. Security Class (This Page) UNCLASSIFIED | 22. Price $0.30 |

FORM NTIS-35 (10-70)

USCOMM-DC 40329-P71

# SANITARY LANDFILL
# DESIGN, CONSTRUCTION, AND EVALUATION

*This report (SW-88ts) was compiled by*
MAXWELL J. WILCOMB
and
H. LANIER HICKMAN, JR.

U.S. ENVIRONMENTAL PROTECTION AGENCY
*Solid Waste Management Office*
1971

## FOREWORD

SANITARY LANDFILLING is an acceptable and recommended method for ultimately disposing of solid wastes. The method has sometimes been confused with waste disposal on open, burning dumps, but this is a misconception. The sanitary landfill is an engineering project that requires sound and detailed planning and specifications, careful construction, and efficient operation. This publication is provided to help designers, operators, and control agencies achieve and maintain good sanitary landfill practices.

The sections on design and construction were developed jointly by the National Solid Wastes Management Association and the Solid Waste Management Office and were published in *Sanitary Landfill Operation Agreement and Recommended Standards for Sanitary Landfill Design and Construction.* They have been modified in this document. The evaluation method was prepared by training specialists in the Solid Waste Management Office.

–RICHARD D. VAUGHAN
*Assistant Surgeon General*
Acting Commissioner
Solid Waste Management Office

BLANK PAGE

# SANITARY LANDFILL
# DESIGN, CONSTRUCTION, AND EVALUATION

A sanitary landfill is an engineered method in which solid wastes are disposed of by spreading them in thin layers, compacting them to the smallest practical volume, and covering them with earth each day in a manner that minimizes environmental pollution.

While it is possible to construct a sanitary landfill on nearly all topographies, some land formations are more difficult than others to use. This makes each sanitary landfill somewhat different, and it would be impossible to delineate the techniques required at every potential site. The discussions in this document are intended to cover those features and procedures that are intrinsic to a good sanitary landfill operation.

The recommendations in this document suggest the basic requirements involved in designing and constructing a sanitary landfill. In addition, an evaluation method is provided to enable the operator, designer, or control agency to determine whether the site is achieving a good operation. The evaluation method is divided into two sections: the first discusses those requirements that must be met before a site can be called a sanitary landfill; the second covers items that upgrade the overall operation but must be judged in terms of local requirements. The evaluation procedure includes a checklist recommended for field use by those familiar with the evaluation.

The Solid Waste Management Office has developed the evaluation method for the express purpose of providing a tool that a community, organization, consultant, official, or citizen can use to judge the design and construction of any site under consideration. The use of this document no way guarantees that good design and construction can be achieved, but if the principles advanced are understood and applied, good design and construction will certainly be easier to attain.

## SANITARY LANDFILL DESIGN

### *Site Location Requirements*

The disposal site shall: (1) be easily accessible in any kind of weather to all vehicles expected to use it; (2) safeguard against water pollution originating from the disposed solid waste; (3) safeguard against uncontrolled gas movement originating from the disposed solid waste; (4) have an adequate quantity of earth cover material that is easily workable, compactible, free of large objects that would hinder compaction, and does not contain organic matter of sufficient quantity and distribution conducive to the harborage and breeding of vectors; (5) conform with land use planning of the area.

### *Site Design*

The project plan shall include a general location map and topographic map of the area showing land use and zoning within 1/4 mile of the solid waste disposal site. The topographic map shall be of such a scale that it shows all homes, buildings, wells, watercourses, dry runs, rock outcroppings, roads, and other pertinent details.

The project plan shall also include a plot of the site that shows dimensions, location of soil or rock borings, proposed trenches or original fill face, winter cover stock piles, and fencing. Cross sections shall be included on the plot plan or on separate sheets that illustrate both the original ground and proposed fill elevations. The scale of the plot plan should not be greater than 200 feet per inch.

A report shall accompany the plans regarding; (1) population and area to be served; (2) anticipated types, quantities, and sources of solid wastes to be disposed of; (3) site geology, hydrology, and soil conditions; (4)

source and pertinent engineering properties of cover material and the projected method of protecting it for winter operations; (5) types and numbers of equipment to be used for excavating, earth moving, spreading, compacting and other purposes; (6) persons responsible for the actual operation and maintenance of the site and intended operating procedures; (7) ultimate plan for the completed site.

The design of the sanitary landfill shall include one or more topographic maps at a scale of not over 200 feet to the inch; contour intervals shall not exceed 5 feet. The maps shall show: the proposed fill area; any borrow sections; access roads; grades for proper drainage of each lift required and a typical cross section of a lift; special drainage and gas control devices if necessary; fencing; equipment shelter; existing and proposed utilities; employee facilities; and all other pertinent information to indicate clearly that the sanitary landfill will be developed, operated, and completed in an orderly manner.

The sanitary landfill should be designed by a registered professional engineer.

### *Operational Design Features*

The disposal site shall be provided with operational features and appurtenances necessary to maintain a clean and orderly operation; (1) control of access to the site by fencing or other suitable means; (2) an all-weather access road (if excessively bad weather makes the working face inaccessible, it may be necessary to provide a landfill area near the entrance to the site; (3) suitable devices, such as portable fences, for litter control.

In addition to the required features, there are others that are highly recommended: (1) operational plans to direct and control the use of the site; (2) signs indicating traffic flow, hours of operation, and any charges for disposal; (3) scales for weighing the solid waste received (in a small operation periodic weighing on public or other scales is acceptable; (4) dust control methods (these may require the use of chemicals, oils, or water sprays); (5) communication devices for emergency use and for operational control; (6) electrical service for operations and repairs; (7) fire protection and fire-fighting facilities adequate to ensure the safety of employees and provisions for dealing with accidental burning of solid waste in the landfill; (8) first-aid equipment and training.

### *Personnel and Personnel Facilities*

In order to man and operate the site adequately the following are recommended: (1) a trained supervisor or foreman and trained equipment operators; (2) a shelter for employees to use during inclement weather; (3) a potable water supply for landfill personnel and collection crews; (4) sanitary toilets on or near the site; (5) training in the proper and safe operation of all equipment.

### *Equipment*

To assure safe and efficient operation the following are required: (1) sufficient equipment for spreading, compacting, and covering operations; (2) arrangements whereby alternate equipment is provided within 24 hours following an equipment breakdown.

As a further aid, the following are recommended: (1) safety devices on equipment to shield and protect operators; (2) maintenance and storage shelters.

## SANITARY LANDFILL CONSTRUCTION

### *General*

Certain operations must be carried out:

1. Access to the site must be controlled to keep unauthorized persons out and to assist the landfilling operation. (Access shall be allowed only when an attendant is on duty and only to authorized users.)
2. Burning of waste material shall be prohibited.

3. Blowing paper shall be controlled by providing a portable fence near the working area, and the entire area shall be policed at least daily.

4. Salvaging and scavenging shall not be allowed at the working face.

5. Provision shall be made to ensure that no pollution of surface or ground water is created.

6. Provisions shall be made for on-site control of potential gas movement from the landfill.

Other operations are strongly recommended:

1. Operational records should be maintained daily. They should include the type, weight, and volume of solid wastes received; type and volume of cover material used; the portion of the landfill used (determined by cross section and survey); any deviations made from the original plan of operation; and equipment maintenance and cost records. A monthly report should be prepared that describes the amounts of solid waste received, the area of the fill used, the volume of the fill used, and the amount of the cover material used. The report should be submitted to the appropriate governmental agency. Cost records should be maintained and should conform to those recommended by the Solid Waste Management Office in *An Accounting System for Sanitary Landfill Operations*, U.S. Public Health Service Publication No. 2007.

2. Upland surface drainage should be diverted around the site to control infiltration at the fill site and erosion of the in-place cover material.

3. Conditions unfavorable for the habitation and production of insects and rodents should be maintained by carrying out sanitary landfill operations promptly and systematically. It is recommended that the site be inspected regularly by an independent pest control firm and certified reports submitted to the appropriate government agency. Supplemental vector control measures should be instituted when necessary. Domestic animals should be excluded from the site, and proper control measures should be used to control wildlife, when necessary.

4. A detailed description and a plat of the completed fill site (as built) should be recorded with the proper local agency responsible for maintaining titles and records of land to provide notice to future users and owners of the site. The detailed description should include but not be limited to: type and location of pollution controls, and original and final terrain descriptions.

5. Continual training of personnel in the proper operation of a sanitary landfill should be provided.

### *Landfilling*

Certain procedures are required during landfilling:

1. The working face shall be as small an area as the equipment can safely and efficiently operate in.

2. The solid waste shall be spread and compacted in thin layers. In the construction of each cell, it shall be spread into layers that do not exceed 2 feet prior to compaction. The number of layers incorporated into a cell depends on the design and configuration of the site.

3. All solid waste shall be covered daily with at least 6 inches of compacted soil. Daily cover has three main functions: to provide insect and rodent control, to provide fire breaks between cells, and to prevent exposure and blowing of litter and to offer an aesthetically pleasing site at the end of the working day. The in-place cover must be maintained until further filling or the addition of final cover is made.

4. Final cover shall be applied to any surface that represents the final grade of the sanitary landfill; 2 feet of compacted soil is required. Trees, shrubs, and other plants often require more than two feet of soil to grow. Suitable grasses should be planted to prevent erosion and surface deterioration. Final cover shall be placed over any completed section of

the fill within 7 days following the placement of solid waste within that portion.

Other procedures are recommended during landfilling:

1. Supervision should be available to coordinate all unloading activities.
2. Special provisions should be made for vehicles being unloaded by hand so that the flow of mechanically unloading vehicles is not impaired.
3. Final cover should be graded to drain surface run-off water. For this reason, it is best to slightly overdesign initial grades so that when settlement occurs, the surface will be sufficient for good drainage. The top surface should slope 2 to 4 percent, and the side slopes should not be so steep as to cause an erosion problem.

### *Special Waste Handling*

Handling and disposing of waste sludges, waste liquids, and hazardous materials shall be given special consideration with regard to water pollution and the health and safety of employees. Large bulky items should be reduced in volume before daily cover is applied.

### *Supervision and Inspection*

The following recommendations apply:

1. The supervisor of the operation should be an individual who has had experience in earthmoving, waste handling, and disposal.
2. Routine inspection and evaluation of landfill operations should be made by a representative of the appropriate regulatory agency. A notice of any deficiencies, together with any recommendations for their correction, should be provided to the owner or agent responsible for the use of the land and the appropriate individual or firm or governmental agency responsible for the landfill operation.
3. A representative of the appropriate regulatory agency should inspect the completed sanitary landfill before the earthmoving equipment is removed, and any corrective work should be performed before the landfill project is accepted as completed. Arrangements should be made for all cracked, eroded, and uneven areas in the final cover to be repaired as required during the years following completion of the fill.

## SANITARY LANDFILL EVALUATION

This evaluation method is intended to measure the level of acceptability of the operations taking place at a disposal site, as well as to provide an overall comparison of its suitability to that of other evaluated sites. The evaluation consists of two subsets of evaluative criteria. The first subset comprises 10 Requirements, all of which must be satisfied if the site is to qualify as a sanitary landfill.

If the operation is a sanitary landfill, the second subset (13 Recommended Items) is provided to achieve a broader evaluation of other features of sanitary landfill design and construction. Operations vary due to size and locality, and certain items may not be required. An exceptional sanitary landfill would meet all Requirements and Items.

Each Requirement and Item in the evaluation is followed by a statement of what is needed to qualify, the reasoning for the statement, and the criteria that must be met. The sanitary landfill should be inspected in detail in order to complete the evaluation. (A suggested check list is included to aid in the evaluation.) Some criteria will require that the operator or supervisor answer certain questions, and precautions should be taken, therefore, to assure that the questions are understood and that the answers are reliable. If possible, written documentation should support the answers.

### *Sanitary Landfill Requirements*

*Requirement A: Open Burning Prohibited.* No solid waste shall be burned at the sanitary landfill.

*Basis:* Open burning of solid waste creates odors, air pollution, and fire and safety hazards. It also adversely affects public acceptance of the operation and proper location of future sanitary landfill sites. Local laws that allow or require the open burning of such materials as diseased elm trees and condemned dry foods are outmoded. Such materials can either be incorporated within the sanitary landfill or disposed of in such a manner as to prevent health hazards or nuisances. Open burning for any reason converts the operation to that of the open dump.

*Open burning of solid waste on the site is prohibited at all times. Yes__ No__*

*Requirement B: Access Limited.* Access to a sanitary landfill shall be limited to those times when an attendant is on duty and only to those authorized to dispose of solid waste.

*Basis:* If public use is allowed when no attendant is on duty, scavenging, burning, and indiscriminate dumping commonly occur. Men and equipment must then be diverted to restore sanitary conditions. When access to the site during operating hours is limited to those authorized, traffic and other accident hazards are minimized.

*Access by unauthorized vehicles or pedestrians is controlled. Yes__No__*

*Requirement C: Spreading and Compacting.* Solid waste shall be spread in uniform layers not over 2 feet thick prior to compaction.

*Basis:* Successful operation and maximum utilization of a sanitary landfill depend on adequate compaction of the solid waste. In addition, settlement will be excessive and uneven if this is not done. Settlement permits invasion by insects and rodents and severely limits the usefulness of the finished area.

Compaction is best initiated by spreading the solid waste evenly in shallow layers, and better compaction is achieved if the working face is operated on a slope. Further compaction is provided by the repeated travel of equipment over the layers and, if necessary, by the use of special equipment.

*Solid waste is properly spread and compacted. Yes__No__*

*Requirement D: Daily Cover.* A uniform compacted layer of at least 6 inches of suitable earth cover shall be placed on all exposed solid waste by the end of each working day.

*Basis:* Daily covering is necessary to prevent insect and rodent infestation, blowing litter, fire hazards, an unsightly appearance, and to control gas and water movement. Fly emergence generally is prevented by 6 inches of compacted soil. Daily covering also divides the fill into "cells" that will limit any underground fires that might occur. The cover material should be easily workable and compactible, should be free of large objects, and should not contain organic matter of sufficient quantity and distribution conducive to the harborage and breeding of vectors.

*A uniform, compacted layer of at least 6 inches of suitable earth cover is used for daily cover. Yes__ No__*

*Requirement E: Final Cover.* A uniform layer of earth cover compacted to a minimum depth of 2 feet shall be placed over the entire covered surface of each portion of the final lift. This shall be done not later than one week following the placement of solid waste within that portion.

*Basis:* A minimum final cover of 2 feet of compacted suitable earth cover will prevent emergence of insects from the compacted solid waste, minimize the excape of odors,

prevent rodents from burrowing, provide for control of gas and water movement, support plant growth, and provide an aesthetically acceptable finished site. This cover also provides an adequate bearing surface for vehicles and is of sufficient thickness for cover integrity in the event of settlement or erosion. Workability and compaction characteristics should at least equal those provided for daily cover.

*A minimum final cover of 2 feet of compacted earth cover is used as stated.*
*Yes__No__*

*Requirement F: Environmental Protection.* The location and the operation must have the approval of the appropriate governmental agency, such as the State Department of Health. There shall be no contamination of ground or surface waters by deposited solid wastes or their products of decomposition, and no hazard or nuisance caused by gases or other products generated by the biologically or chemically active wastes.

*Basis:* Location, nature of the waste deposited, and substandard operational procedures may lead to pollution of surface waters or underground aquifers. Unless proper standards of location and operations are followed offensive and dangerous concentrations of gases may occur in the soil or above ground and adversely affect the environment. It may be necessary to provide special construction techniques or alter operations to control such conditions.

*Solid waste is placed so that the environment is not and will not be adversely affected.*
*Yes__No__*

*Requirement G: Blowing Litter Controlled.* Blowing litter shall be controlled by fencing placed near the working area or by the use of earth banks or natural barriers. The entire site shall be policed at least daily. Unloading shall be performed so as to minimize the scattering of the solid waste.

*Basis:* The purpose of the sanitary landfill is to dispose of solid waste in a nuisance-free manner. If papers and other light materials are scattered and the area is not policed, fire hazards, nuisances, and unsightliness result.

*Blowing litter is controlled and the site and surrounding area routinely policed.*
*Yes__No__*

*Requirement H: Salvage Prohibited.* Salvaging shall not be permitted at the working face of the sanitary landfill.*

*Basis:* Nothing can be tolerated that interferes with the prompt sanitary disposal of solid waste. Salvaging at the working face delays the filling operation and creates unsanitary conditions. The accumulation of salvaged materials also provides harborage for vectors and promotes an unsightliness that can be detrimental to public acceptance of the opera tion.

*Salvaging is never allowed at the working face.*
*Yes__No__*

*Requirement I: Operational Considerations.* Provision shall be made for all-weather access roads leading to the disposal site, and written provisions and guarantees shall be made for the replacement of operating equipment when it is down for more than 24 hours.

*Basis:* The purpose of a sanitary landfill is the immediate disposal of solid waste, because this results in the elimination of nuisances and produces an aesthetically acceptable operation. A major breakdown of operating equipment for more than 24 hours reverts the

*Any salvage or reclamation of solid waste materials must take place in a systematic and controlled manner at some site other than the operating area. If such a facility is physically located on the same land plat or nearby, it should *not* be considered part of the sanitary landfill operation.

sanitary landfill operation to an open dump. Access roads that are not negotiable by collection vehicles cause unnecessary delays in the disposal operation.

Sanitary landfills utilizing more than one piece of equipment are normally able to operate efficiently even if one piece of equipment has a major breakdown because it may have sufficient reserve capacity. Smaller operations that involve only one piece of equipment require some type of prior written agreement that guarantees the equivalent of standby equipment within 24 hours after any major breakdown.

Heavy duty use of equipment requires that a schedule of inspection and maintenance be followed to keep it operational under normal conditions (See Recommended Item 5).

*Provisions have been made to assure all-weather access roads and to guarantee the equivalent of standby equipment within 24 hours following major breakdown to normal operating equipment. Yes__No__*

*Requirement J: Special Waste Handling.* Toxic, pathogenic, corrosive, flammable, explosive, and other hazardous wastes shall be handled only if special provisions are made.

*Basis:* Materials such as oil sludges, chemical wastes, magnesium shavings, empty pesticide containers, and contaminated medical wastes can be a special hazard to employees and to the environment if their presence is not known or if they are improperly handled. The site must also have special evaluations to determine that there will be no adverse effects on the environment.

*Suitable procedures are established and followed for disposal of special wastes or the wastes are excluded. Yes__No__*

*Sanitary Landfill Recommended Items*

*ITEM 1: Instructions for Users.* Signs should be posted that clearly indicate the purpose of the operation, the owner or operator of the site, hours of operation, instructions for after-hours delivery, materials accepted or excluded, fees charges, and emergency telephone numbers.

*Basis:* The site is typically intended to include use by the general public, and guidance must, therefore, be given regarding the location and purpose of the activity and its relationship to the user. Proper use of the site is not guaranteed, but instruction is an essential step in gaining compliance.

A sanitary landfill may sometimes be called a "land reclamation project" or something similar but *never* a "dump," because this term connotes an unacceptable operation. Provision of some method of storage, such as a bulk container near the gate, is an added service for the small hauler or householder who arrives after hours. Persons arriving at the site should quickly be able to determine if their material will be accepted and if so, the cost per unit (ton, cubic yard, etc.). If there should be an emergency such as a fire, either during or after working hours, or a person is injured, clearly posted numbers will expedite obtaining assistance.

*Suitable informational and directional signing is provided at the entrance and/or other appropriate locations. Yes__No__*

*ITEM 2: Measuring Facilities.* Provision should be made for weighing or adequately measuring all the solid waste delivered.

*Basis:* A suitable method of measuring incoming or deposited solid waste is desirable to provide a reliable quantity of data to determine trends and to estimate needs. Estimates of volumes based on truckloads rather than weights are misleading. Weighing is the best basis for establishing fees, and scales should be required as an integral part of the operation. Determination of the volume increments in deposited solid waste may be done

by making periodic volumetric surveys; this permits the use-rate and remaining capacity of the site to be evaluated.

*Suitable fixed or portable scales have been installed and are used continuously, or the sanitary landfill is routinely "cross-sectioned" at least every 30 days to determine volumes in place. Yes__No__*

*ITEM 3: Communications.* Telephone or radio communications should be provided.

*Basis:* Communications are desirable at the generally remote sanitary landfill sites, in case of emergency. If the sanitary landfill is part of a combined collection and disposal system, good communications will result in better performance throughout the system.

*Reliable communications are installed at the site. Yes__No__*

*ITEM 4: Employee Facilities.* Suitable shelter and sanitary facilities should be provided for personnel.

*Basis:* Shelter should be available to employees during inclement weather, and toilet and handwashing facilities are desirable.

*Permanent or temporary shelter of adequate size is provided along with safe drinking water, sanitary handwashing and toilet facilities, suitable heating facilities, screens, and electricity (if needed). Yes__No__*

*ITEM 5: Equipment Maintenance.* Provision should be made for routine maintenance of equipment and for prompt repair or replacement.

*Basis:* Equipment breakdowns of a day or more result in the accumulation of uncovered solid waste (as at an open dump) with all the attendant health hazards and nuisances. Systematic, routine maintenance of equipment reduces repair costs, increases life expectancy, and helps to prevent breakdowns. In the event of a breakdown, prompt repair of equipment will materially shorten down time.

*Facilities for routine maintenance are available, and provisions for major maintenance and repair have been made. Yes__No__*

*ITEM 6: Unloading Area and Working Face.* The unloading of the solid waste should be controlled and restricted to an area where the material can easily be incorporated into the working face with the equipment available.

*Basis:* Proper operation requires systematic placement of the solid waste in a restricted unloading area. Unloading must be coordinated with spreading and compacting. Controlled unloading reduces work, conserves landfill volume, permits better compaction, minimizes scattering of solid waste, and expedites unloading.

The type and size of the unloading area depends on the amount of solid waste received, the type of operation, and the size of the working face. A large working face increases the area to be compacted and covered, with resulting high cost, delays, and unnecessarily exposed solid waste.

*Unloading is controlled at all times by signs or a supervisor, and the size of the unloading area is balanced with the size of the working face to allow collection vehicles to unload promptly. Yes__No__*

*ITEM 7: Fire Protection.* Suitable measures should be taken to prevent fires and to control them if they start.

*Basis:* Fires endanger life and property. Smoke and odors are nuisances to nearby property owners, endanger disposal personnel, and interfere with sanitary landfilling operations. Deliberate burning makes sanitary landfills almost the equivalent of open dumps.

*An adequate supply of hoses and of water under suitable pressure is available or a stockpile of earth is maintained reasonably close to the working face of the fill to smother fires; suitable fire extinguishers are on all equipment and in all buildings. Yes__No__*

*ITEM 8: Bulky Waste Handling.* Large or bulky items, sewage solids or liquids (septic tank or cesspool pumpings, sewage sludge, and grit), and other materials that are hard to manage should be disposed of only if special provisions are made.

*Basis:* Sewage solids or liquids are hard to handle, potentially infectious, and capable of creating health hazards or nuisances if not properly handled. When the sanitary landfill design includes special provisions for the disposal of such large or bulky items as car bodies, refrigerators, water heaters, demolition wastes, tree stumps, logs and branches, they need not be excluded.

*Suitable procedures are established and followed for disposal of hard-to-handle materials. Yes__No__*

*ITEM 9: Vector Control.* Conditions unfavorable for the production of insects and rodents should be maintained by carrying out routine operations promptly in a systematic manner. Supplemental vector control measures can be instituted if necessary.

*Basis:* Proper operation denies insects and rodents food and harborage. Incoming solid waste loads and a rural setting are, however, natural environments for vectors. If any appear, a supplemental vector control program will quickly eliminate them.

*Vector control is adequately provided. Yes__No__*

*ITEM 10: Dust Control.* Suitable control measures should be taken wherever dust is a problem.

*Basis:* Excessive dust at the sanitary landfill can slow down operations, cause accidents, harm equipment, create aesthetic problems, and lead to injuries.

*Dust control measures are applied as needed. Yes__No__*

*ITEM 11: Accident Prevention and Safety.* Employees should be instructed in the principles of first aid and safety and in the specific operational procedures necessary to prevent accidents. An adequate stock of first-aid supplies should be on hand.

*Basis:* The use of heavy earth-moving equipment, the maneuvering of collection trucks and other vehicles, and the infectious, explosive, or flammable items that may be in solid waste can create accident hazards. Since some sites are in remote locations, it is particularly important that personnel be oriented to accident hazards, trained in first aid, and provided first-aid supplies. For reasons of safety, only those authorized to use the site should have access to it.

*Employees are given periodic safety training; an adequate first-aid kit and at least one employee trained in first-aid are available at the site at all times. Yes__No__*

*ITEM 12: Drainage and Grading.* The entire site should be graded or provided with drainage facilities to minimize runoff onto the sanitary landfill, to prevent the erosion of earth cover, and to drain rain water from the surface of the sanitary landfill. The final surface of the sanitary landfill should be graded to a slope of at least one percent, but no surface slope should be so steep as to cause erosion of the cover. The surface drainage should be consistent with the surrounding area and should in no way adversely affect proper drainage from adjacent land.

*Basis:* Runoff from lands adjacent to the site, unless diverted, and rain falling on the surface

of the site may percolate into the sanitary landfill and contaminate either ground or surface waters. Cover material may also be removed by erosion, and standing water may permit mosquitos to breed or interfere with access, unloading, compacting, or placement of cover. To have the sanitary landfill recognized as an acceptable solid waste disposal method, it is important that the complete sanitary landfill blend with its surroundings and not impair adjacent land usage.

*The sanitary landfill is properly graded and drained. Yes__No__*

*ITEM 13: Plan Development and Execution.* A sanitary landfill should be planned and designed by a qualified individual. Planned use of the site following construction should be an integral part of the planning, design, and construction. A daily log should be maintained by the supervisor to record such operational information as type and quantity of solid waste received, type and volume of cover material used, the portion of the site used, and deviations made from the plans and specifications. A copy of the original plans and specifications, a copy of the daily log, and a plan of the completed sanitary landfill should be filed with the local governmental agency responsible for maintaining titles to land.

*Basis:* Completed sanitary landfill sites are ultimately utilized for a variety of purposes. When the ultimate use of the site is known beforehand, the operation can be planned so that suitable building sites, roads, and utilities can be provided. Final grades can be established and allowances made for landscaping and drainage. A record of the construction of the sanitary landfill is necessary for the most efficient utilization of the completed site and for the prevention of health hazards or nuisances.

*Plans, record keeping, and reporting are achieved as delineated above. Yes__No__*

## Sanitary Landfill Evaluation Checklist

| Requirements | No | Yes |
|---|---|---|
| A. Open Burning Prohibited | _____ | _____ |
| B. Access Limited | _____ | _____ |
| C. Spreading and Compacting Accomplished | _____ | _____ |
| D. Daily Cover Applied | _____ | _____ |
| E. Final Cover Applied | _____ | _____ |
| F. Environmental Protection Provided | _____ | _____ |
| G. Litter Control Provided | _____ | _____ |
| H. Salvage Prohibited | _____ | _____ |
| I. Operational Considerations | _____ | _____ |
| J. Special Waste Handling | _____ | _____ |

### Recommended Items

| | | |
|---|---|---|
| 1. Operation Instructions for Users Provided | _____ | _____ |
| 2. Measurement Provided | _____ | _____ |
| 3. Communications Available | _____ | _____ |
| 4. Employee Facilities Provided | _____ | _____ |
| 5. Equipment Maintenance Facilities Provided | _____ | _____ |
| 6. Unloading Area and Working Face Controlled | _____ | _____ |
| 7. Fire Protection Provided | _____ | _____ |
| 8. Bulky Waste Handling Provided | _____ | _____ |
| 9. Vector Control Provided | _____ | _____ |
| 10. Dust Control Provided | _____ | _____ |
| 11. Accident Prevention and Safety Practiced | _____ | _____ |
| 12. Drainage and Grading Provided | _____ | _____ |
| 13. Planning, Development, and Plan Execution Provided | _____ | _____ |

Remarks:

_____

_____

_____

_____